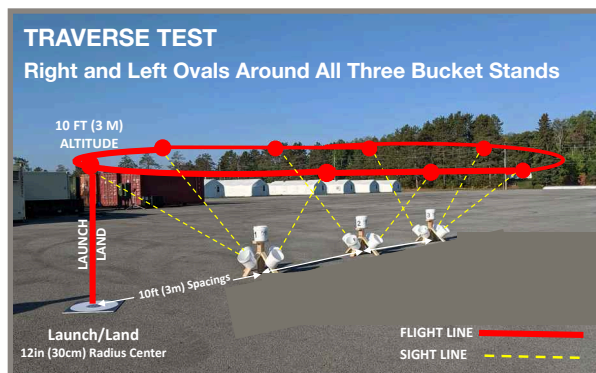
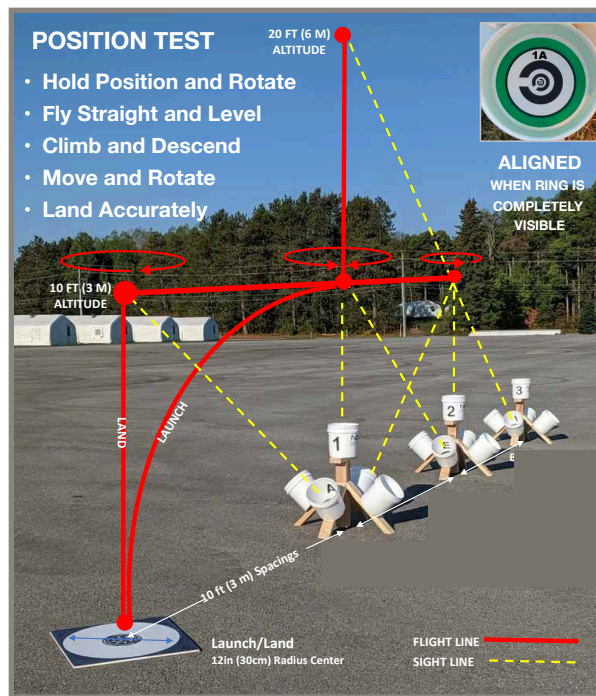
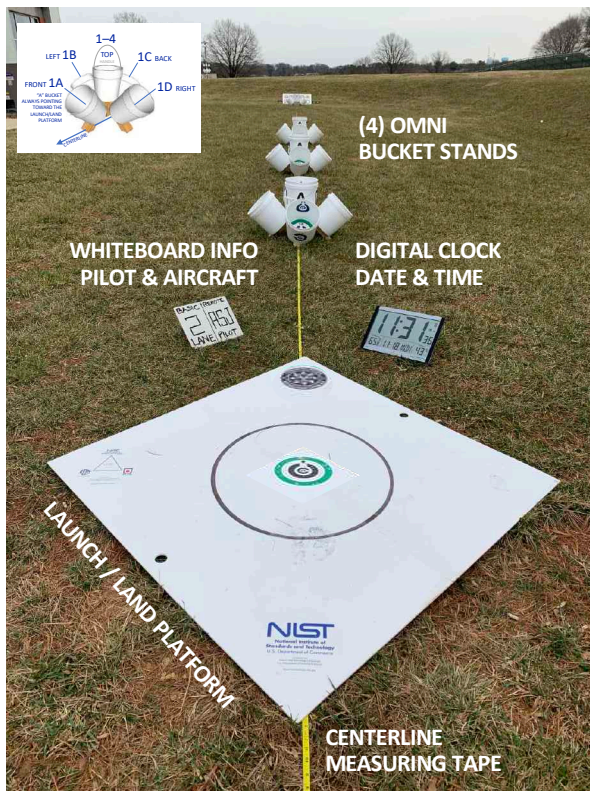


Purpose

These test methods for small unmanned aircraft systems can be used to quantitatively evaluate various system capabilities and remote pilot proficiency. They are being standardized through the *ASTM International Standards Committee on Homeland Security Applications; Response Robots (E54.09)*. They are also referenced as Job Performance Requirements in the *National Fire Protection Association Standard for Small Unmanned Aircraft Systems Used For Public Safety Operations (NFPA 2400)*.

These test methods are primarily intended for vertical takeoff and landing systems with an onboard camera and remote pilot display.



Test Director

Adam Jacoff

Intelligent Systems Division
Nat'l Institute of Standards and Technology
U.S. Dept. of Commerce
RobotTestMethods@nist.gov | 301-975-4235

Sponsor

Philip Mattson

Science and Technology Directorate
U.S. Dept. of Homeland Security

Standard Test Methods for Small Unmanned Aircraft Systems

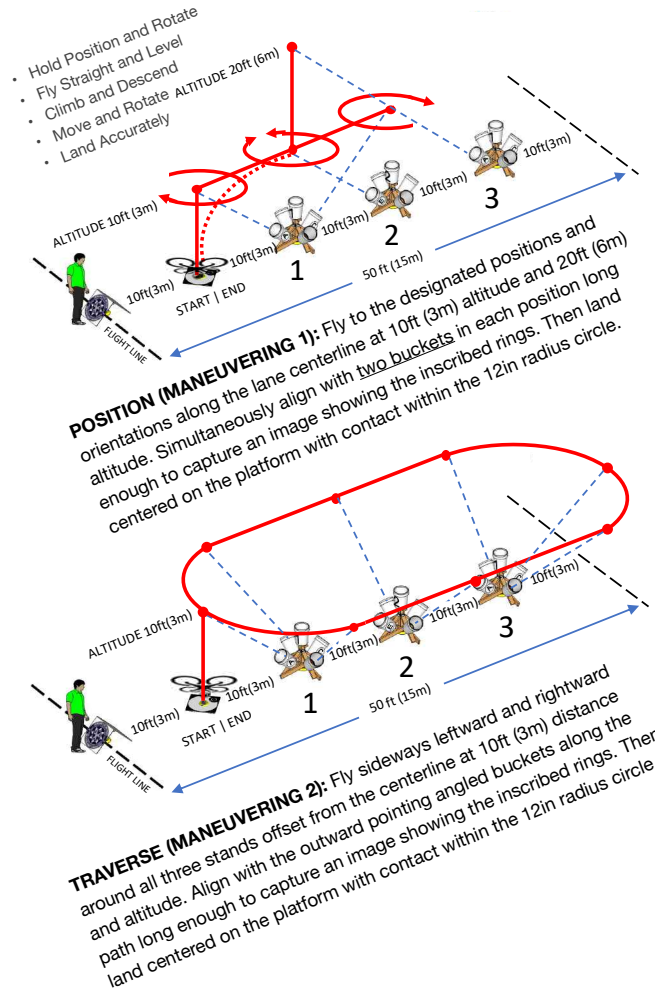
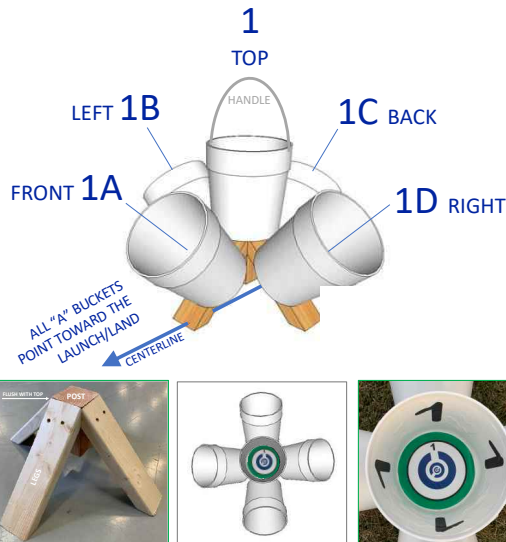
Basic Proficiency Evaluation for Remote Pilots

Flying safely in our national air space requires knowledge and skill. The FAA's Part 107 written test ensures remote pilots understand air space restrictions and safety precautions. This brochure introduces a basic skills test for remote pilots to evaluate "positive aircraft control" at all times. More comprehensive tests are available [online](https://www.faa.gov/uas/remote-pilot-certificate).

These standard test methods provide a reproducible way to train and measure remote pilot proficiency for professionals and recreational pilots. Organizations can establish their own minimum proficiency requirements to improve operations while reducing risk to ground personnel and manned aircraft in the area.

Website: RobotTestMethods.nist.gov

The Position and Traverse tests are performed sequentially by a remote pilot in direct line of sight, or with the pilot's back turned to represent flying beyond visual line of sight with an assisting visual observer. The aircraft flies the designated flight paths to align with one or more white buckets. Each alignment requires a single image of the inscribed green ring inside the bottom of the buckets. Perform all 40 alignments and accurate landings within the designated time limit. Visual acuity targets evaluate camera pointing and zooming capabilities along with color, thermal, hazmat labels, or other objects. Faults resulting in an end-of-trial include extreme deviations from the intended flight path or contact with the apparatus, ground, or safety enclosure.



Omni Bucket Stands , Launch/Land Platform, Measuring Tape Centerline

- * (QTY 01) 15m (50ft) measuring tape centerline
 - * (QTY 01) square panel with 30cm (12in) radius circle
 - * (QTY 03) 10x10x15cm (4x4x6in) posts
 - * (QTY 12) 5x10x30cm (2x4x12in) legs with 45deg tapers
 - * (QTY 30) 7.5cm (3in) screws attach legs to post – 2 per
 - * (QTY 30) 4cm (1-1/2in) screws attach buckets – 2 per
 - * (QTY 15) 7.5-liter (2-gallon) white buckets
 - * (QTY 52) 20cm (8in) round polyester weatherproof labels.
- Download and print targets and lettering from the online [USAGE GUIDE](#) or at [RobotTestMethods.nist.gov](#).
- * A thick black marker can also be used to inscribe 2.5cm (1in) rings inside buckets with written letters and numbers.

CIRCLE SUCCESSFULLY ALIGNED BUCKET IMAGES OR STRIKE THROUGH IF MISSED		
START TIMER AT LAUNCH OR CAPTURE INITIAL IMAGE OF CLOCK		
POSITION (MAN 1)	CIRCLE ALIGNED	
1 LAUNCH TO 10ft (3m) OVER STAND #1	1 & 2A	
2 YAW RIGHT 360° OVER STAND #1	1 & 2A	
3 YAW LEFT 360° OVER STAND #1	1 & 2A	
4 CLIMB TO 20ft (6m) OVER STAND #1	1 & 3A	
5 DESCEND TO 10ft (3m) OVER STAND #1	1 & 2A	
6 FORWARD OVER STAND #2	2 & 3A	
7 BACKWARD OVER STAND #1	1 & 2A	
8 FORWARD/YAW RIGHT 180° OVER STAND #2	2 & 1C	
9 FORWARD/YAW LEFT 180° OVER LANDING	L & 1A	
10 LAND CENTERED FACING STANDS (2 POINTS POSSIBLE)	<24in <12in	
TRAVERSE (MAN 2)	CIRCLE ALIGNED	
11 HOVER AT 10ft (3M) OVER THE LAUNCH PLATFORM	1A	
12 TRAVERSE LEFTWARD AROUND STANDS	1B	
13 CONTINUE	2B	
14 CONTINUE	3B	
15 CONTINUE	3C	
16 CONTINUE	3D	
17 CONTINUE	2D	
18 CONTINUE	1D	
19 CONTINUE	1A	
20 LAND CENTERED FACING STANDS (1 POINT)	<12in	
<<<<<<<<<<<<<<< REVERSE DIRECTION >>>>>>>>>>>>		
21 HOVER AT 10ft (3M) OVER THE LAUNCH PLATFORM	1A	
22 TRAVERSE RIGHTWARD AROUND STANDS	1D	
23 CONTINUE	2D	
24 CONTINUE	3D	
25 CONTINUE	3C	
26 CONTINUE	3B	
27 CONTINUE	2B	
28 CONTINUE	1B	
29 CONTINUE	1A	
30 LAND CENTERED FACING STANDS (1 POINT)	<12in	
LAND BEFORE TIMER EXPIRES OR CAPTURE FINAL IMAGE OF CLOCK		
FAULT: APPARATUS GROUND BOUNDARY SAFETY Circle a Fault Condition Resulting in End of Trial		/40
SET MINIMUM THRESHOLD OF PROFICIENCY : FAIL _____ /40		PASS